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## (54) Beam for supports and relative method to obtain said beam

(57) Beam for supports (10), advantageously horizontal to support static loads in vertical stores, obtained through forming metal sheet and having a square or rectangular section, wherein at least the upper horizontal side (11) is obtained by continuous folding of the metal sheet.

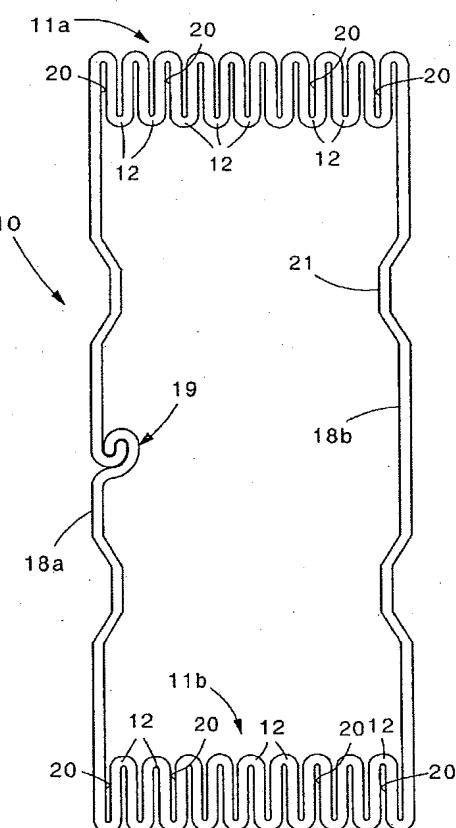


fig. 1

**Description****FIELD OF THE INVENTION**

**[0001]** The invention concerns a beam for supports and the method to obtain it.

**BACKGROUND OF THE INVENTION**

**[0002]** The state of the art includes beams consisting of tubular profiles with a polygonal section obtained starting from metal sheet and continuously welding butt-wise the two closing edges of the profile.

**[0003]** In the case of stores, in relation to the thickness of the original metal sheet and in relation to the dimensions of the two sides of the rectangle or square, these beams have a thickness greater than necessary on the long sides which, when installed, are positioned vertically, and a thickness less than necessary on the short sides which, in practice, are positioned horizontally when installed.

**[0004]** In the case of square, box-like profiles too, there is the same problem.

**[0005]** In fact, during the storing phase, wherein the beam only has to support a static load, normal tubular profiles, given the same sizes, have excess resistance, whereas during the phase when the load is applied, they are sometimes insufficient.

**[0006]** The French patent FR-A-1,006,281 discloses a beam with a substantially rectangular transverse section, formed by a first upper metal sheet shaped like an upside-down U, and a second plane metal sheet fixed below the first. The first sheet is folded so as to define fretted folds on the upper side and triangular folds on the lateral sides. The distance between the fretted folds however does not give enough strength and resistance to vertical loads.

**[0007]** The French patent FR-A-2,151,641 discloses a beam formed by coupling two metal sheets folded into a T and made integral with each other in correspondence with the shanks of the two Ts, arranged horizontally and having undulated folds which make the structure weak in the central part.

**[0008]** The British patent GB-A-1,566,702 discloses a beam composed of an undulated and folded metal sheet; this beam is very complex, difficult to achieve and therefore not very economical.

**[0009]** The European patent application EP-A-0,495,738 discloses a beam wherein the lower side consists of a metal sheet folded into a zig-zag and welded to a metal sheet above which is shaped like an upside-down U and without folds. This beam, however, does not give much resistance to surface loads.

**[0010]** The European patent application EP-A-0,855,157 discloses a beam made with a metal sheet folded so as to form a substantially rectangular transverse section, in which, on the upper and lower short sides, metal reinforcement elements are welded, which

make the beam heavy and expensive.

**[0011]** The present invention intends to solve the above-mentioned problems with a new beam obtained with a new method.

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**SUMMARY OF THE INVENTION**

**[0012]** According to the invention, the inventive idea is set forth in the respective main claims, regarding product and method.

**[0013]** According to the invention, a tubular profile with polygonal transverse section, advantageously square or rectangular, is obtained starting from a thin metal sheet.

**[0014]** The sheet has a thickness varying from about 1.0 mm to 2.5 mm to obtain a section varying from 40 to 60 mm for the short side and from 80 to 150 mm for the long side. These sizes depend on the unitary load which the beam has to support.

**[0015]** According to the invention, at least the short side which is positioned above consists of a desired sequence of continuous folds of a desired height.

**[0016]** This height varies from 6 mm to 15 mm.

**[0017]** The folds are made in sequence with a suitable number of forming passes.

**[0018]** According to the invention, the folds obtained are such as to keep the rising sheet and the descending sheet, and so on in alternation, in close contact so as to make a single piece.

**[0019]** According to a variant of the invention, the folds are connected together by means of a series of forming passes. In the same passes the edges are closed by means of seaming.

**[0020]** Once the profile has been obtained, it is subsequently formed through sizing rollers to become a single piece, the whole thing being produced in line from a strip of sheet.

**[0021]** According to a further variant, the folds are connected to each other by a point or line of welding, all made at intervals.

**[0022]** According to a further variant, the lateral coupling of the folds is obtained with a U-shaped rider element, put at intervals or continuously for substantial lengths, which is inserted with its terminal legs between the two lateral folds.

**[0023]** According to a further variant, the folded zone is made integral with a through pin put at intervals and welded at the ends.

**[0024]** According to a further variant, both the short sides are obtained in the same way and that is with folds.

**[0025]** According to a further variant, on the long sides there is at least a modification of the line in order to improve the structural strength. This modification of the line can be U-shaped, V-shaped or C-shaped, or have another shape, as the geometric shape is unimportant.

**[0026]** According to the invention, the beam is obtained starting from a strip of a desired width and, starting from the central fold, by making the folds which make

up at least a short side.

[0027] According to the invention, the other folds, the packing thereof and the clamping of the lateral edges occur in a progressive sequence, with two steps that may be carried out simultaneously.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0028] These characteristics and advantages of the invention will be apparent from the following description of a preferential form of embodiment, given as a non-restrictive example with reference to the attached drawings, wherein:

Fig. 1 shows a beam according to the invention; Fig. 2 shows the connection of the loops by welding; Figs. 3 and 4 show two further variants of the invention.

#### DETAILED DESCRIPTION OF PREFERENTIAL EMBODIMENT

[0029] Fig. 1 shows a beam 10 according to the invention, obtained from a metal sheet folded so as to define a tubular profile having a substantially rectangular transverse section.

[0030] The tubular profile has two long sides 18a and 18b, an upper short side 11a and a lower short side 11b.

[0031] When installed, the short sides 11a and 11b are substantially horizontal.

[0032] In the long side 18a there is the system to clamp the edges 19 of the sheet, while on both the long sides 18a and 18b the longitudinal modification of the line 21 is shown as an example.

[0033] In the short sides 11a and 11b there are folds 12, with the relative loops 20, the sides of which are substantially vertical and in contact with each other.

[0034] Fig. 2 shows a variant of the upper short side 11a where the folds 12 are connected with each other by welding points 13 operating in the ridges of the loops 20.

[0035] Figs. 3 and 4 show further variants of the short side 11a of the beam 10. To be more exact, in Fig. 3 the folds 12 are connected with each other by a pin 14 which is made integral, at its ends, with the long sides 18a and 18b. Fig. 4 shows the lateral clamping of the loops 20 by means of a U-shaped rider element 15 which has terminal legs 16a and 16b which are inserted, or point, respectively, into the loops 20 of two lateral folds 17a and 17b, and is made integral therein by means of welding.

[0036] The method to obtain the beam 10 as described heretofore comprises a step of folding a strip of metal sheet, of the desired length, to form said folds 12 progressively starting from a central fold.

[0037] According to a variant, the beam 10 as described heretofore is obtained by means of a forming machine.

#### Claims

1. Horizontal beam for supports able to support static loads in vertical stores, obtained through forming metal sheet and having a polygonal transverse section with a substantially horizontal upper side (11a) **characterized in that** at least said upper side (11a) is obtained by continuous folding of said metal sheet which defines a plurality of folds (12) the sides of which are substantially vertical and in contact with each other.
2. Horizontal beam as in claim 1, **characterized in that** the height of said folds (12) varies from 6 to 15 mm.
3. Horizontal beam as in any claim hereinbefore, **characterized in that** said metal sheet is from about 1.0 to 2.5 mm thick.
4. Horizontal beam as in any claim hereinbefore, **characterized in that** at least one vertical side (18a or 18b) of said folded sheet has a modification to its line (21).
5. Horizontal beam as in any claim hereinbefore, **characterized in that** the folds (12) are made integral by welding (13) performed at intervals.
6. Horizontal beam as in any claim from 1 to 4 inclusive, **characterized in that** said folds (12) are made integral with a U-shaped rider element (15) inserted into two lateral folds (17a and 17b) and welded thereto.
7. Horizontal beam as in claim 6, **characterized in that** said U-shaped rider element (15) has a defined length and is located at intervals between said folds (12).
8. Horizontal beam as in any claim from 1 to 4 inclusive, **characterized in that** said folds (12) are made integral by means of a through pin (14) clamped at the ends.
9. Method to obtain a horizontal supporting beam as in any claim from 1 to 8 inclusive, **characterized in that** said folds (12) are made in progression in a strip of metal sheet of a desired length, starting from a central fold.
10. Method to obtain a horizontal supporting beam as in any claim from 1 to 8 inclusive, **characterized in that** said beam (10) is obtained by means of a forming machine.

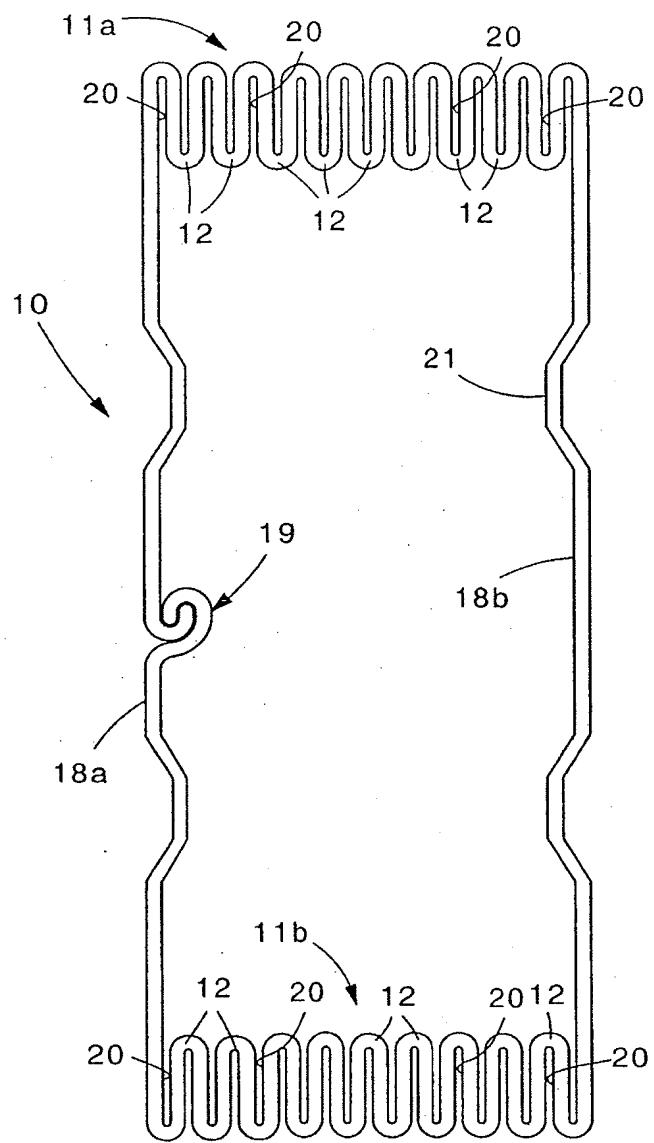


fig. 1

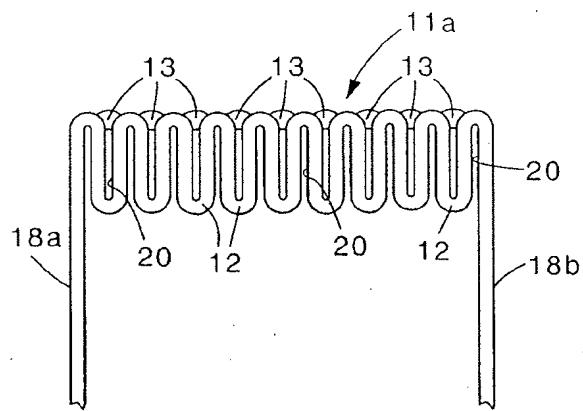


fig. 2

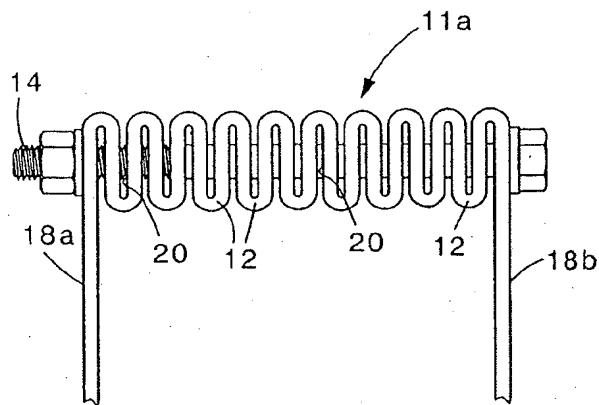


fig. 3

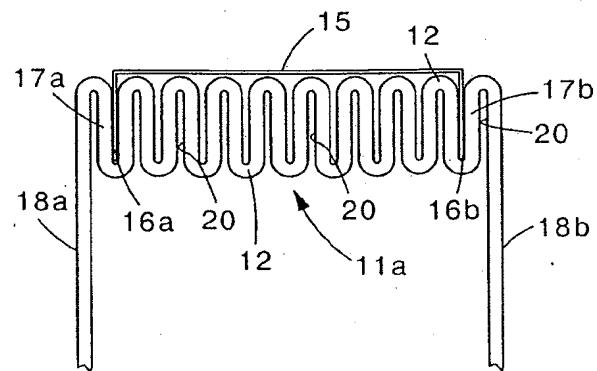


fig. 4



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A	EP 0 855 157 A (LOSEY LTD) 29 July 1998 (1998-07-29) * column 4, line 27 - column 7, line 11 * * figures 1-7 *	4	
<p>The present search report has been drawn up for all claims</p>			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	3 July 2002	Papatheofrastou, M	
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.

EP 02 00 8709

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